

311-316). The collagen used in Hughes et al is bovine collagen (Hughes et al, column 10, lines 31-50). The dominant amino acids in bovine collagen are glycine, proline and alanine (total 55%, *see* Table 2 of Bolboacă et al on page 313). None of these amino acids carry any charge. From the other 45% asparagine and glutamine (total 5.6%) carry a negative charge, while arginine and lysine (total 8.8%) carry a positive charge which implies that the net charge of collagen is very close to neutral. Cysteine is only present in a very small amount (i.e. less than 1%).

Keratin, on the other hand, contains a considerable amount of cysteine (*see* the attached extract from the Kirk-Othmer Encyclopedia of Chemical Technology, 1978, 12, 81, second full paragraph). Schrooyen et al teaches on page 9, lines 2-13, a treatment whereby the –SH groups of the cysteine amino acids are modified to form sulphonate groups having a negative charge. According to Schrooyen et al this treatment enhances the dispersibility of the keratins. However, it is clear that the keratin resulting from this treatment has a negative charge on each sulphonate group. Hence, the net negative charge of a keratin polymer is considerable. As shown above, the collagen taught by Hughes et al on the other hand, is very close to neutral, maybe even bear a positive charge.

Furthermore, in Hughes et al, the collagen cross-linked protein is hydrolyzed into smaller fragments having a molecular weight of above 300,000 Da, preferably above 1,000,000 Da (Hughes et al, column 5, lines 39-41). Schrooyen et al, on the other hand, teach that the partially hydrolyzed keratin has a molecular weight of between 1000 and 10,400 Da (Schrooyen et al, page 10, lines 19-23). Hence, the collagen hydrolysates of Hughes et al are much larger than the keratin hydrolysates of Schrooyen et al.

In view of these considerable fundamental differences between the teachings of Schrooyen et al and Hughes et al the skilled person would never use the partially hydrolyzed keratin as taught by Schrooyen et al in the method described by Hughes et al, even when Schrooyen et al teach that such keratin hydrolysate would have antimicrobial and antioxidant activity.

From the above, one can only conclude that the skilled person would never have combined the teachings of Schrooyen et al and Hughes et al, and even if he did he would have

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considered such a combination (which explicitly is submitted that he would not) he would not have any expectation of success.

For the above reasons it is respectfully submitted that claims 1-14 define inventive subject matter. Reconsideration and allowance are solicited. Should the examiner require further information, please contact the undersigned.

Respectfully submitted,

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